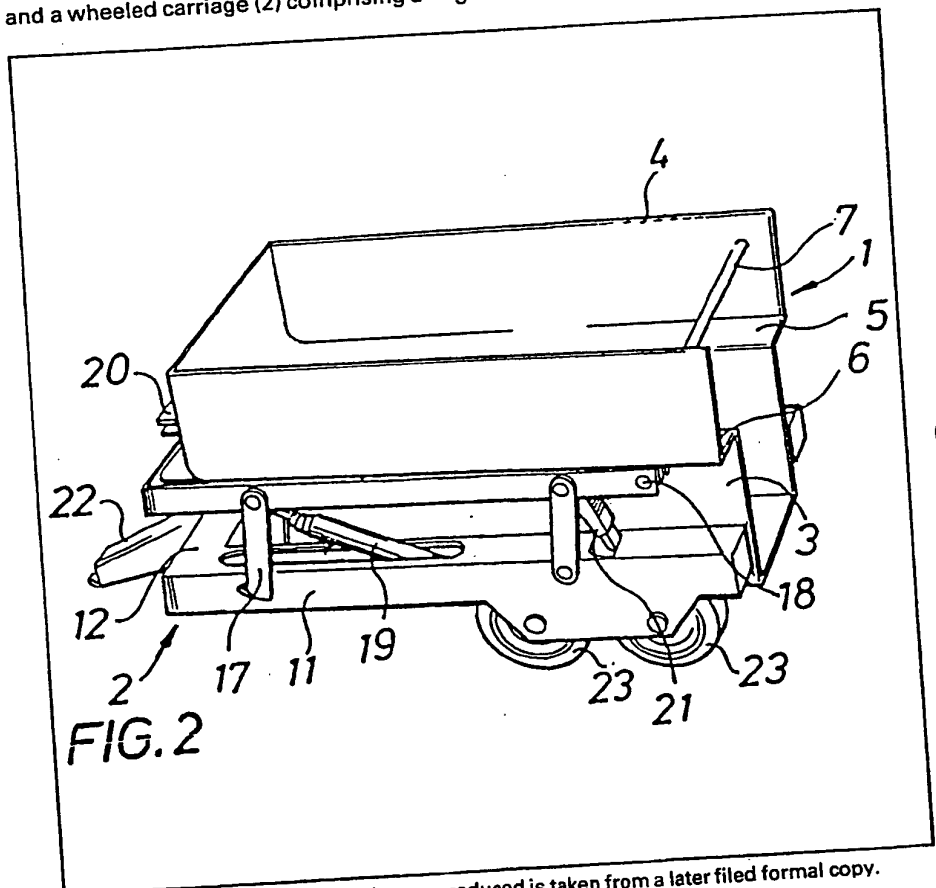


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(54) Materials handling system and apparatus

(57) A materials handling system comprising a load carrier (1) having a ground engaging portion (3) and a downwardly directed surface (6) extending laterally outwards on either side of the ground engaging portion (3) and a wheeled carriage (2) comprising a

main frame having spaced parallel side members (11) on which is mounted lifting means. The lifting means comprises spaced elongate members connected to the side members (11) by parallel linkages (17) and movable between a lowered position and a raised position by jacks (19). Tipping means comprising longitudinally extending members pivotally connected to one end of the elongate members and movable between a normal out-of-use position and a tipping position by the jacks (19) may be provided for tipping a load carrier (1) supported on the lifting means. The wheeled carriage (2) is adapted to straddle the ground engaging portion of the load carrier (1) with the lifting means positioned beneath said downwardly directed surfaces (6) so that the lifting means can be actuated to raise the load carrier to a transport position in which the ground engaging portion thereof is clear of the ground.



The drawings Figures 4-6 originally filed were informal and the print here reproduced is taken from a later filed formal copy.

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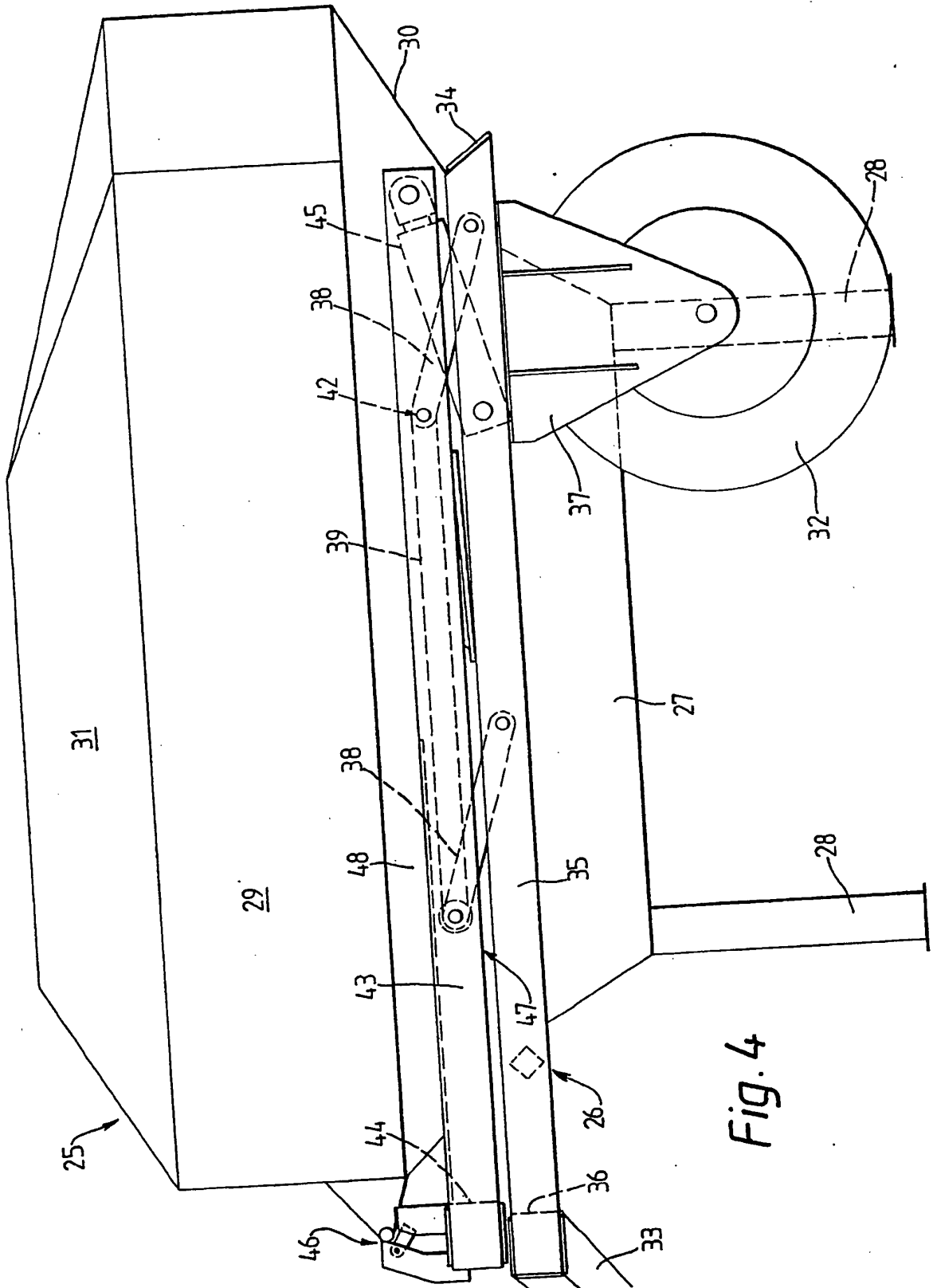


Fig. 4

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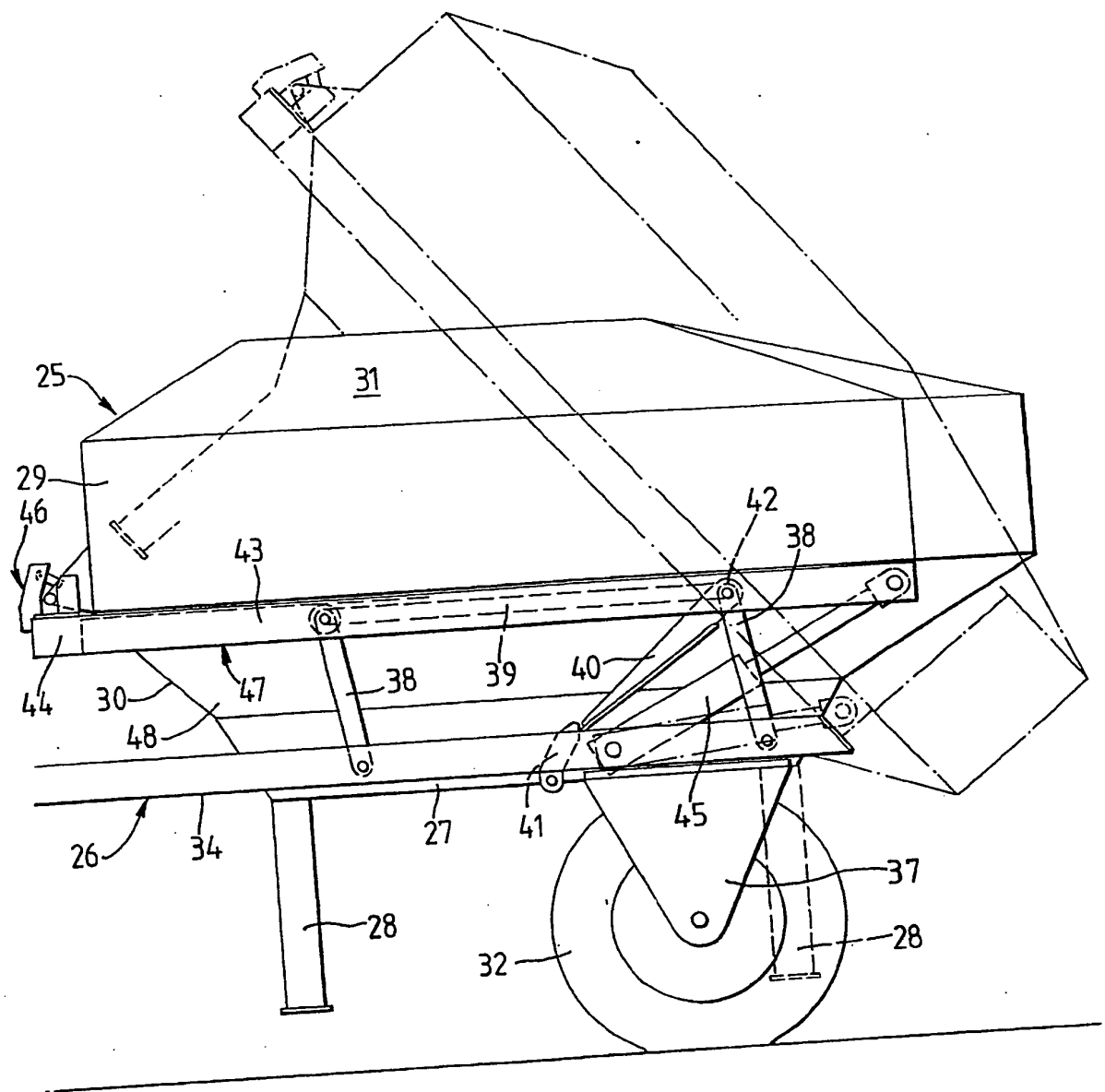


Fig. 6

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pair of elongate members each of which is connected to one side member of the main frame and is movable, as by suitable jack means, between a lowered position and a raised position. Preferably each of said elongate members is connected to its respective main frame side member by parallel linkages which will maintain it in parallelism with the frame side member as it is moved between said lowered and raised positions. According to a preferred embodiment of the present invention said elongate members are connected together by a transverse member at the same end thereof as the side frame members are connected together so that the lifting means comprises a U-shaped sub-frame mounted on and movable relative to the main frame. It is preferred that the wheeled carriage be capable not only of lifting and transporting said load carrier but also of tipping the load carrier so as to facilitate the removal of materials therefrom. To this end said elongate members may each have pivotally connected thereto at one end thereof a longitudinally extending member and means may be provided for raising the other end of each of said longitudinally extending members so as to tip a load carrier supported by its said downwardly directed surfaces on said longitudinally extending members. Again said longitudinally extending members may be connected together at that end thereof which corresponds to said one end of said side members. Thus said tipping means may comprise a further U-shaped auxiliary tipping frame mounted on and pivotally connected to one end of said sub-frame. Means may be provided on said tipping means whereby a said load carrier can be releasably connected thereto to prevent the load carrier sliding off the tipping means during the tipping operation. Likewise, suitable releasable locking means may be provided for maintaining said sub-frame in its raised position during transport of a said load carrier. The means for raising said other ends of said longitudinally extending members may be separate from the means for moving the elongate members between their lowered and their raised positions. However, according to a preferred embodiment, the same means is utilised for both raising the elongate members and for tipping the longitudinally extending members. Such means may comprise a suitable jack or jacks, e.g. a pair of hydraulic or pneumatic jacks. According to one embodiment a pair of jacks is provided one end of each of which is pivotally connected to one of said main frame side members and the other end of each of which is pivotally connected to said other end of one of said longitudinally extending members, the arrangement being such that initial extension of said jacks will move said elongate members between their lowered and their raised positions and continued extension of said jacks will raise said other ends of said longitudinally extending members. If desired or necessary means may be provided for releasably securing said longitudinally extending members to said elongate members whilst said elongate members are being moved between their lowered and their raised positions.

According to another embodiment said longitu-

inally extending members extend at one end beyond said one end of the elongate members and are pivotally connected to the elongate members at said one end of the elongate members only and a jack is connected between each of the of the main frame side members and said one end of the longitudinally extending members. Releasable locking means is provided for locking the elongate members in their raised position with this arrangement the jacks are extended to move the elongate members to their raised position said locking means engaged to lock the elongate members in raised position and the jacks retracted to pivot the longitudinally extending members on the elongate members and so effect tipping. The reverse procedure i.e. extension of the jacks, release of the locking means and retraction of the jacks, first returns the longitudinally extending members to their normal untipped position and then moves the elongate members to their lowered position.

If desired the wheeled carriage of the materials handling system of the present invention could comprise a motor vehicle. According to a preferred embodiment, however, the wheeled carriage comprises a trailer which is adapted to be releasably connected to and towed by a suitable motor vehicle, e.g., a suitable tractor or tractor unit. The wheeled carriage may have as many wheels or axles as is thought desirable or necessary and the term "wheeled carriage" is intended to be interpreted in its broadest possible sense and to include, for example, not only wheels as such but also endless tracks, e.g., for use in conditions where the ground is very soft such as in swamps, paddy fields, and the like. Where the wheeled carriage is in the form of a trailer then it may have one or more sets of wheels at the open end thereof and may be adapted for towing from the other end thereof and one or more retractable legs may be provided at said other end thereof for supporting the wheeled carriage when it is not connected to a towing vehicle.

The invention will be more particularly described with reference to the accompanying drawings, in which:-

Figure 1 is a diagrammatic perspective view of apparatus according to the present invention comprising a load carrier and a wheeled carriage shown being moved into a position ready to lift the load carrier for transport,

Figure 2 is a diagrammatic perspective view of the apparatus of *Figure 1* showing the load carrier in raised position on the lifting means ready for transport, and

Figure 3 is a diagrammatic perspective view of the apparatus of *Figures 1* and *2* and showing the load carrier being tipped to empty material therefrom.

Figure 4 is a side elevation of another embodiment of load carrier and wheeled carriage according to the present invention, the wheeled carriage being shown in a position ready to lift the load carrier for transport,

Figure 5 is a view similar to *Figure 4* but showing the load carrier in an early stage of being lifted, and

Figure 6 is a view similar to *Figures 3* and *4* but on a smaller scale which shows the load carrier fully

using wheeled carriages of substantially the same length and that when filled with crops the load carriers are removed from the fields using the same wheeled carriage and are deposited on the nearest adjacent or accessible road. There the load carriers 15 can be transported two or more at a time, e.g., to a remote storage facility or factory for processing, using a wheeled carriage 2 of a length sufficient to carry said two or more load carriers.

10 A further advantage of the apparatus of the present invention is that the wheeled carriage 2 basically comprises only three U-shaped frames 8, 9 and 10 which can readily be fabricated from standard commercially available steel of suitable cross

15 sections. Referring now to Figures 4, 5 and 6 it will be seen that the materials handling apparatus illustrated therein comprises a load carrier 25, which again is in the form of a bin, and a wheeled carriage 26.

20 The load carrier 25 comprises a lower portion 27 provided with ground engaging legs 28 and of a width such that it can be straddled by the wheeled carriage 26, an upper portion 29 which is essentially wider than the lower portion 27 and which in the 25 illustrated embodiment is also longer than the lower portion 27, and a tapered intermediate portion 30 connecting the upper portion 29 with the lower portion 27. The top of the upper portion 29 is closed by a suitable hood or cover 31 which may have one 30 or more openings (not shown) therein to enable the load carrier to be loaded. A rear end of the upper portion 29 may be open or have an opening therein, which may be closable by a hinged flap or other suitable closure, to enable the load carrier to be 35 emptied by tipping.

The wheeled carriage 26 is in the form of a trailer and has two wheels 32 at the rear end thereof and a towing bar 33 or other suitable means at the front thereof whereby it can be releasably connected to a 40 towing vehicle (not shown). The wheeled carriage 26 comprises a main frame 34 which is substantially U-shaped in plan view and comprises a pair of spaced side members 35 which are connected together at their front ends only by a transverse 45 member 36, the main frame being mounted on the wheels 32 by means of brackets 37 connected to the side members 35. Mounted on each of the side members 35 of the main frame 34 by means of 50 parallel linkages 38 is an elongate member 39, the elongate members 39 being separate from one another and not joined together at one end as in the previous embodiment. Pivotaly mounted on each of the elongate members 39 is a locking pawl 40 which, when the elongate members 39 are moved from 55 their lowered position shown in Figure 4 to their raised position shown in Figure 6, engages with a releasable locking member 41 to lock the elongate members 39 in their raised position. Pivotaly connected at 42 to the rear ends only of the elongate 60 members 39 are a pair of spaced longitudinally extending members 43 which are connected together at their front ends by a transverse member 44 to form a substantially U-shaped tipping frame 47. The rear ends of the longitudinally extending 65 members 43 extend rearwardly beyond the rear

ends of the elongate members 39 and a jack 45 is pivotally connected at one end to each of the main frame side members 35 and at the other end to the rear end of the adjacent longitudinally extending 70 member. Suitable releasable locking means 46 is provided for retaining the load carrier 25 on the tipping frame 47.

The tapered intermediate portion 30 of the load carrier 25 provides two laterally outwardly and 75 downwardly directed surfaces 48 for engagement by the longitudinally extending members 43 of the tipping frame 47, these surfaces 48 tending to self-centre the load carrier 25 on the tipping frame when the load carrier 25 is lifted to a transport 80 position as is described below.

In the use of the materials handling apparatus illustrated in Figures 4, 5 and 6, the wheeled carriage 26 is moved into a position in which it straddles the lower portion 27 of the load carrier as shown in 85 Figure 4 and the locking means 46 is engaged. The jacks 45 are then extended to move the elongate members 39 together with the tipping frame 47, from their lowered position shown in Figure 4 to their raised position shown in Figure 6, thus raising 90 the load carrier 25 to its transport position shown in solid outline in Figure 6. When the elongate members 39 are in their raised position the locking pawls 40 automatically engage the releasable locking members 41 to lock the elongate members 39 in 95 their raised position. If it is desired to tip the load carrier 25 the jacks 45 are retracted so that the tipping frame 47 pivots relative to the elongate members 39 about the pivot points 42 as shown in broken chain lines in Figure 6. Reversal of the above 100 described sequence of events will first return the load carrier 25 and tipping frame 47 to the normal transport position and will then lower the load carrier 25 onto the ground so that the wheeled carriage can be moved out of engagement there- 105 with. Figure 5 shows the situation where the elongate members 39 and tipping frame 47 have been raised to a position where the longitudinally extending members 43 of the tipping frame 47 have engaged the surfaces 48 of the load carrier 25 but the 110 load carrier has not yet been raised from the ground.

CLAIMS

1. A materials handling system comprising at 115 least one load carrier and a wheeled carriage for the transport of said load carrier, the load carrier comprising a ground engaging portion and at least one downwardly directed surface extending laterally outwards on either side of said ground engaging 120 portion at a predetermined height above the bottom of said ground engaging portion, and said wheeled carriage comprising (a) a main frame having a pair of spaced substantially parallel side members and means connecting said side members together at 125 one end only, and (b) lifting means mounted on said main frame and having a retracted position less than said predetermined height and a raised position greater than said predetermined height, the arrangement being such that, with said load carrier sup- 130 ported on the ground and said lifting means in

26. A wheeled carriage according to claim 25, wherein said lifting means comprises a pair of spaced elongate members each of which is connected to a said side member of the main frame by parallel linkages and jack means for moving the elongate members between the lowered and the raised positions.

27. A wheeled carriage according to claim 26, wherein tipping means is provided on said elongate members for tipping a load carrier supported thereon.

28. A materials handling system substantially as herein described with reference to Figures 1 to 3 or Figures 4 to 6 of the accompanying drawings.

29. A load carrier for a materials handling system, substantially as herein described with reference to Figures 1 to 3 or Figures 4 to 6 of the accompanying drawings.

30. A wheeled carriage for a materials handling system, substantially as herein described with reference to Figures 1 to 3 or Figures 4 to 6 of the accompanying drawings.

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